LINEAR RATEMETER
Model 1480

Instruction Manual

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LINEAR RATEMETER
Model 1480

Section 1

INTRODUCTION

1.1 GENERAL

The Canberra Model 1480 Linear Ratemeter presents, via 2-1/2 inch front panel meter, the average number of pulses per second being received at the front or rear panel input connectors. A simultaneous rear panel output allows continuous recording of the average pulse rate on a strip chart recorder.

The Model 1480 has thirteen full scale ranges in 1-2-5 sequence from 10 to 10^5 counts per second, permitting accurate reading at any input rate, or the choice of extremely wide dynamic range.

The input pulses may be integrated over any one of four switch-selected time constants, from 0.5 to 40 seconds. A front panel background subtraction control permits the automatic subtraction of background counts up to 100% of full scale reading.

The Model 1480 offers ± 0.5% linearity, a 3% precision front panel meter, and a 1% rear panel recorder output accuracy.

1.2 APPLICATIONS

Counting experiments are frequently concerned with the rate (events/unit time) at which certain nuclear events occur. One means for performing this function is with a scaler gated by a timer counting for a fixed time period.

A simpler approach, less costly although less accurate, is to use an instrument which electronically performs the counts/unit time calculation: the Model 1480 Linear Ratemeter.

Using various other modules, the events counted may be restricted by energy range or by time coincidence, or may simply be a gross count of all activity.

Section 2

SPECIFICATIONS

2.1 PERFORMANCE

RANGE	Thirteen full scale range steps from 10 to 100,000 counts per second
LINEARITY	± 0.5% of full scale range selected
READOUT ACCURACY	Meter ± 3%, recorder output ± 1%
PULSE PAIR RESOLUTION	Less than 0.5 microseconds
TEMPERATURE	Less than 2% drift over 0 to 50°C range

2.2 INPUTS

SIGNAL INPUT	1 to 10 volts, positive or negative, unipolar or bipolar; greater than 0.15 microseconds wide; input impedance 1000 ohms; front panel BNC connector

2.3 OUTPUTS

READOUT	Front panel 2 1/2 inch meter; thirteen full-scale ranges from 10 to 10^5 cps
RECORDER	0 to 10mV; adjustable to 20mV full scale; rear panel BNC connector

2.4 CONTROLS

COARSE RANGE	Front panel switch selection of 10^1, 10^2, 10^3 10^4 cps
FINE RANGE	Front panel switch selection of X1, X2, X5, X10 Coarse Range setting
TIME CONSTANT	Front panel switch selection of 0.5, 2, 10, 40 seconds
SIGNAL	Front panel switch selection of POS, NEG, CAL; CAL position represents AC power line frequency (50-60 Hz) for check of ratemeter calibration
ZERO ADJUST	Front panel screwdriver slotted potentiometer, to set zero level of meter with no input
BACKGROUND SUBTRACTION	Front panel ten-turn potentiometer, up to 100% of full scale

SECTION 3

INITIAL OPERATION

3.1 GENERAL

Complete understanding of the purpose of the various controls and connectors is required for the proper operation of the Model 1480, and it is recommended that this section be read before proceeding with the operation of the instrument.

3.2 SETUP

1. Insert module in AEC compatible base unit/power supply such as Canberra Model 1400; adjust meter, via plastic screwdriver adjustment on face of meter, to read zero; turn on power switch.

2. After Model 1480 has been On for at least 5 minutes, readjust meter to zero (if necessary) by using Zero Adjust control below meter on front panel.

3. Set Background Subtract potentiometer to 0.

4. Set Time Constant switch to 2 seconds

5. Set Coarse Range switch to 10^2.

6. Set Fine Range switch to 2.

7. Switch Input Control to CAL position.

3.3 INITIAL CHECKOUT

1. Observe pulse rate of 60 Hz (or 50 Hz depending on line) on front panel meter using the scale corresponding to the fine range control; multiply the scale reading by the coarse gain setting to obtain actual pulse rate (i.e., times 10^{-})

2. Change Fine Range switch to 5 and then to 1; note different scale readings all indicate same input pulse rate. To use Fine Range setting of 1, read meter scale corresponding to a setting of 10 and divide indicated rate by ten.

3. Change Coarse Range setting and notice effect on meter reading.

4. By rotating background subtract potentiometer, notice that input can be subtracted until meter reads zero; this control is used in experiments to eliminate the effect of any unwanted noise or background pulses.

5. Connect output of a pulser to the Model 1480. Set INPUT control to POS or NEG according to the pulser.

6. Change pulser frequency and observe rate of changy of Model 1480 readout; repeat using different Time Constant switch settings. Notice that Model 1480 responds to changes in count rate faster at lower integration time constants.

SECTION 4

OPERATING INSTRUCTIONS

4.1 GENERAL

The purpose of this section is to familiarize the user with the operation of the Model 1480 Linear Ratemeter and to check that the unit is functioning correctly. Since it is difficult to determine the exact system configuration in which the module will be used, explicit operating instructions cannot be given. However, if the following procedures are carried out, the user will gain sufficient familiarity with this instrument to permit its proper use in the system at hand.

4.2 CONTROL FUNCTIONS

4.2.1 COARSE RANGE

A four-position front panel switch for selection of 10^1, 10^2, 10^3, or 10^4 cps range for the module. This and the fine range control are used to match input rate to output depending on whether the user desires a wide dynamic range or a highly accurate reading at specific input rates.

4.2.2 FINE RANGE

A four-position front panel switch for selection of X1, X2, X5, or X10 multiples of the Coarse Range switch. On the front panel meter are different scales corresponding to the various Fine Range settings.

4.2.3 TIME CONSTANT

A four-position front panel switch for selection of 0.5, 2, 10, or 40 second time constants. These time constants represent the intervals over which input pulses are integrated for averaging.

4.2.4 INPUT

A three-position front panel switch for selection of POS(itive) or NEG(ative) input pulses. The CAL position should give a 60 or 50 cps readout which is derived from the line frequency. This position is used as a quick check of module calibration.

4.2.5 BACKGROUND SUBTRACT

Front panel ten-turn potentiometer used to subtract background counts not connected with the source of interest. The potentiometer is adjustable from 0 to 100% of full scale.

To subtract background, the entire counting system exclusive of source should be connected and turned on. The background can cause counts to be registered by the Model 1480. With the range set at the settings to be used for the experiment, the BACKGROUND SUBTRACT is adjusted until the meter reads zero.

4.2.6 ZERO ADJUST

Front panel screwdriver control used to adjust the meter to read zero with no input, after the power has been on for 5 minutes or more.

4.2.7 METER ADJUST

A plastic screwdriver control on the front of the meter face used to adjust the meter to zero with power OFF.

BASIC WARRANTY

CANBERRA - MANUFACTURED EQUIPMENT

Equipment manufactured by Canberra Industries, Inc. is warranteed against defects in materials and workmanship for a period of twelve months from date of shipment, provided that the equipment has been used in a proper manner as detailed in the instruction manuals. During the warranty period, repairs or replacement will be made at Canberra's option on a return to factory basis. The transportation cost, including insurance, to and from Canberra, is the responsibility of the Customer. Except for defects discovered upon initial operation, shipping expense to Canberra is to be paid by the customer; shipping expense to return the repaired equipment will be paid by Canberra.

The customer must obtain shipping instructions, including an Authorized Return Number (ARN), before returning any equipment to the Canberra factory. *Compliance with this provision by the customer shall be a condition of this warranty.* In giving shipping instructions, Canberra shall not be deemed to have assumed any responsibility or liability in connection with the shipment. If, upon receipt of the equipment, Canberra determines that such equipment is not defective within the terms of this warranty, the customer shall pay to Canberra, upon invoice, the cost of diagnosis at the then prevailing Canberra repair rate and the cost of return transportation.

The Canberra Basic Warranty applies only to equipment manufactured by Canberra which is returned to the factory. If equipment must be repaired at the customer's site, the actual repair labor and parts will be provided at no charge during the warranty period. However, travel expenses to and from the customer's site, and living expenses while on site, shall be paid by the customer unless an On-Site Warranty Option has been purchased. This option may only be purchased prior to shipment of the equipment to the customer.

This warranty shall not apply to Canberra equipment that has been modified or serviced by other than Canberra Service Personnel, or to failures of Canberra equipment caused by defective equipment not manufactured by Canberra.

The Express warranties set forth herein are the only warranties with respect to the products, or any materials or components purchased from others and furnished by Canberra, and there are no other warranties, expressed or implied. The warranty of merchantibility is expressly limited as herein provided and all warranties of fitness are expressly disclaimed and excluded. Canberra shall have no liability for any special, indirect or consequential damages, whether from loss of production or otherwise, arising from any breach of warranty hereunder or defect or failure of any product or products sold hereunder.

EXCLUSIONS

Warranty service is contingent upon the proper use of all equipment and does not cover equipment which has been modified without Canberra's written approval or which has been subjected to unusual physical or electrical stress as determined by Canberra Service personnel. Canberra Industries shall be under no obligation to furnish warranty service (preventive or remedial): (1) if adjustment, repair or parts replacement is required because of accident, neglect, misuse, failure of electrical power, air conditioning, humidity control, transportation, or causes other than ordinary use: (2) if the equipment is maintained or repaired or if attempts to repair or service equipment are made by other than Canberra personnel without the prior approval of Canberra.

This warranty does not cover detector damage caused by warm-up or by neutrons or heavy charged particles. Damage from these causes is readily identifiable as described in the manual accompanying each detector.

EQUIPMENT NOT MANUFACTURED BY CANBERRA

Canberra's basic one-year warranty applies only to equipment manufactured by Canberra. Although Canberra may frequently supply, as part of systems, equipment manufactured by other companies, the only warranty that shall apply to such non-Canberra equipment is that warranty offered by the original manufacturer if any.

Canberra will, upon request, offer, as an option, warranty coverage for non-Canberra equipment such as computers and peripherals sold as part of a system supplied by Canberra. Quotations on this coverage may be obtained by contacting Canberra Nuclear Systems Division.

SOFTWARE

Canberra warrants proper system operation *only* with programs developed by Canberra using the operating system supplied to the customer. Canberra assumes no responsibility for user-written programs or programs published as part of information exchange in Canberra periodicals.

Engineering assistance for software development is available and can be contracted through the Canberra Nuclear Systems Division Sales Department.

INSTALLATION

Installation of equipment purchased from Canberra shall be the sole responsibility of the customer unless the installation is specifically contracted for at the prevailing Canberra field service rates. To insure timely installation after receipt of equipment, it is recommended that installation be contracted for at the time the equipment is ordered.

ON-SITE WARRANTY OPTION

The On-Site Warranty Option provides for free on-site warranty work (Canberra pays all travel and living expenses) within the first 90 days after delivery of equipment to the customer. If installation is ordered from Canberra, the 90 day period commences upon completion of the initial installation. After the 90 day period, labor and materials used on site will still be covered by the basic warranty, but the customer shall pay for all travel and living expenses incurred for any on-site service.

A maintenance contract may be purchased covering the period after the 90 days on-site warranty period, or after initial installation of the equipment. This is to be contracted through Canberra's Nuclear Systems Division.

REPAIRS

Any Canberra-manufactured instrument no longer in its warranty period may be returned, freight prepaid, to our factory for repair and realignment. When returning instruments for repair, contact the Customer Service Department for shipping instructions and an Authorized Return Number (ARN).

All correspondence concerning repairs should include Model Number and a description of the problem observed.

Once repaired, all equipment passes through our normal pre-shipment checkout procedure. Return shipping expense on out-of-warranty repairs will be charged to the customer.

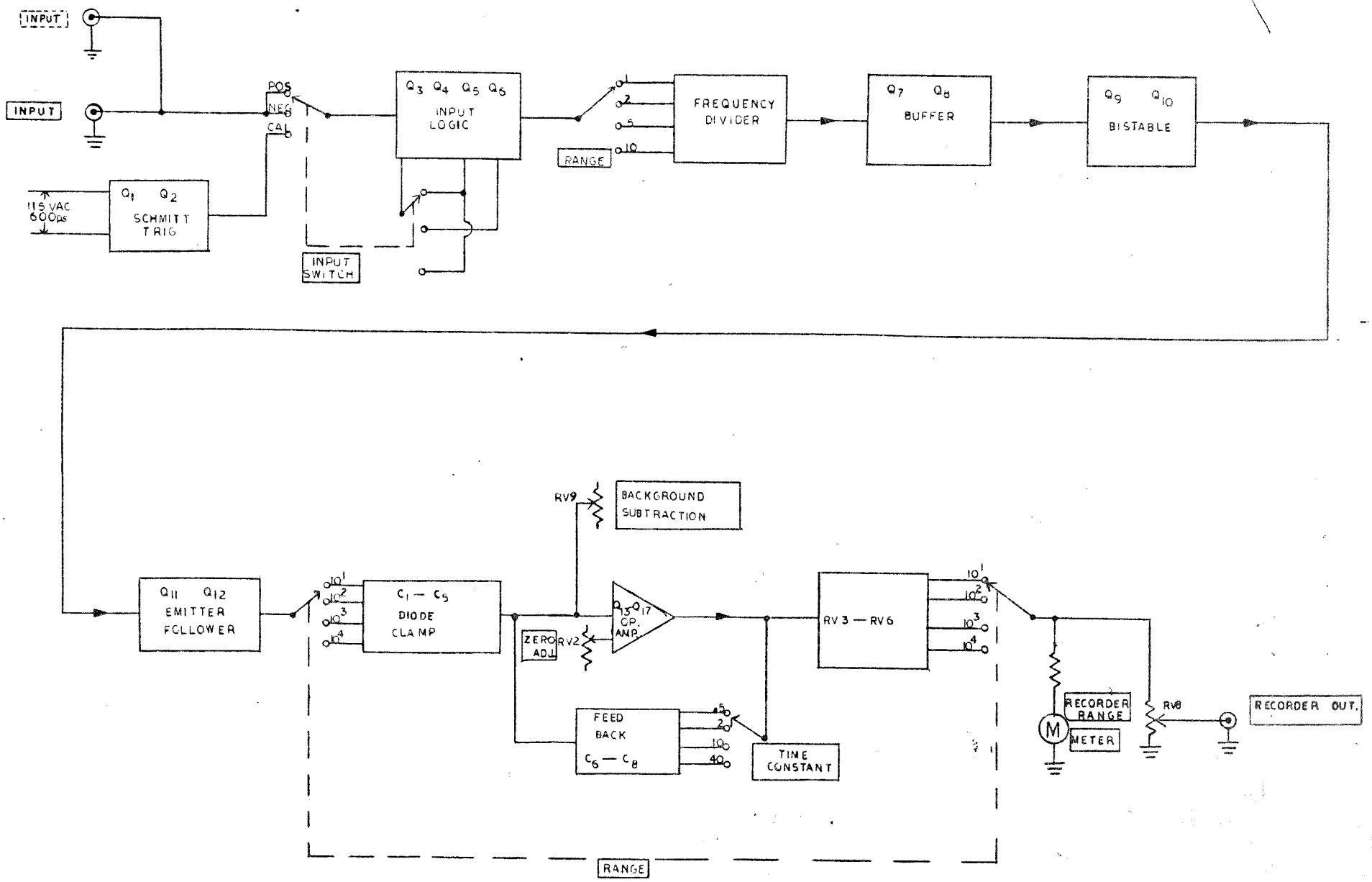
For instruments out of warranty, the customer must supply a purchase order number for the repair before the item will be returned to him.

SHIPPING DAMAGE

Shipments should be carefully examined when received for evidence of damage caused by shipping. If damage is found, immediately notify Canberra and the carrier making delivery, as the carrier is normally responsible for damage caused in shipment. Carefully preserve all documentation to establish your claim. Canberra will provide all possible assistance in processing damage claims.

Due to the delicate nature of cooled detectors [Ge(Li) and Si(Li)] Canberra requires that delivery to and from air freight terminals be handled with special care. Do not ship such Detectors without first obtaining advice from our Traffic Department.

REVISION B
July 1, 1978



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES DECIMAL ± .005 FRACTION ± 1/64 ANGLE ± 1°	TITLE BLOCK DIAGRAM LINEAR RATEMETER MODEL 1480
MATERIAL	SCALE
FINISH	APPROVAL
	DRAWN C.T. 7/10/67
	CHECKED 7/12/67
	STURRUP, INC. 50 SILVER ST. MIDDLETOWN, CONN.
	DRAWING NO. C-10435- REV. A